Fall 2019

ME 452-001: Dynamics of Space Flight

Anthony Rosato

SYLLABUS ME452: Dynamics of Space Flight Fall 2019

Text: *Orbital Mechanics for Engineering Students*, H. D. Curtis (Elsevier, 2010) 2nd Edition
References: Additional materials will be e-mailed during the semester
Office Hours: By appointment. Send e-mail to rosato@njit.edu.
Course Grade: Based on Mid-Term exams and Final Exam.
Homework: Solutions will be e-mailed to the class at the beginning of the semester.

Week	Topic	Reading	Problems
1	Introduction and Review: Kinematics, Newton's Laws, Time derivative of moving vectors, relative motion	Chapter 1	1.1 – 1.10 1.12, 1.13, 1.15
2	Two Body Problem: Motion equations in an Inertial Frame; Relative Motion	2.1 - 2.3	
3	Review of Conic sections; Angular Momentum Orbital Energy	Electronic notes; 2.4, 2.5	
4	Derivation of Equations for Orbital Trajectories: Circular, Parabolic, Elliptic Hyperbolic Trajectories	2.6 – 2.9	2.1-2.3, 2.6, 2.7, 2.8, 2.11, 2.13, 2.15-2.18, 2.21, 2.22, 2.24, 2.30, 2.32 2.37, 2.38
5	***Exam 1***	2.10	
6	Perifocal Frame Restricted Three-Body Problem	2.10 2.11	2.26, 2.32, 2.35, 2.36 2.44, 2.45
7	Orbital Position as a Time Function: Time since Periapsis- Circular Elliptical Trajectories	3.1, 3.2 3.5	3.1, 3.4 - 3.10 3.14
8	Hyperbolic Trajectories Universal Variables	3.6 3.7	3.16 3.19
9	***Exam 2***		
10	Orbits in 3 Dimensions: State vector & Geocentric Frame Orbital Elements and State Vector	4.1 – 4.3 4.4	4.1, 4.2 4.4, 4.5
11	Coordinate Transformations Transformation: Geocentric Equatorial to Perifocal Frames	4.5 4.6	4.8 – 4.11 4.14 – 4.16, 4.19,
12	Effects of Earth's Oblateness	4.7	4.25, 4.26
13	Preliminary Orbit Determination: Gibbs' Method	5.1, 5.2	5.1, 5.2
14	Lambert's Problem	5.3	5.4, 5.5
15	***Final Exam***		Comprehensive

Formulas will be provided on all exams.
Note that additional Homework Problems may be assigned in class.

All violations of the Honor Code will be referred to the Dean of Students.